

Varia prima Varia  
Varia

An Inaugural Disseration  
against the  
Vitality of the blood

By James Kello of Virginia

1807- 11. 8.

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## Inaugural Dissertation

The subject of the vitality of the blood has the honor of great antiquity. We learn that the celebrated Jewish lawgiver, Moses, held in opinion that the blood was vital: and since his time it has been received and sanctioned by many great men as Aristotle, Plato, Galen, Harvey and John Hunter. But neither the antiquity of the opinion, nor these great authorities, ought to make us indolently receive it as truth, or ought to shade it in the least from our investigation.

As Mr Hunters opinions and experiments are the foundation of nearly all those on the subject at present; we shall proceed to examine some of them & see how far they are entitled to our belief or founded in truth.

Chapman's 2<sup>d</sup> edition

The subject of the history of the West  
has the honor of great antiquity, the name  
that the celebrated French language, as this  
the opinion that the West was what  
the time it has been known and the  
by many great men as Aristotle, Plato, and  
Greece and India, that with the  
depth of the opinion, we have just  
ought to make us carefully review it as well as  
ought to state it in the last form our  
information

As the history of the West is a subject of great importance

the foundation of nearly all that is in the

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He says "he cannot see how it is possible that we should think the blood is otherwise than alive, when we consider that every part is formed from the blood, and that we grow out of it." But to me it appears not more difficult to conceive, that living solids should be formed from dead blood, than that living blood should be formed from food destitute of all life.

Mr Hunter ~~made an~~ <sup>made an</sup> experiment ~~with~~ with a view to determine whether recent or coagulated blood would retain heat longest, and from his experiments he concluded that the recent would retain it longest, and hence he decided that the "heat retaining" power of the recent blood was a proof of its vitality.

But doubting whether it was a fact that recent blood would retain heat longer than coagulated, to satisfy myself, I made the following experiments, which being repeated

the way "is not in vain" is possible that  
we should think the first a stronger than the second  
consider that every part is found from the first  
and that we have not of it. That is not to appear  
but more difficult to consider that being so  
should be found from the first that is  
not found about the first from first instance  
of all life.

~~the first instance of life~~  
a time is determined which is not in any way  
that would be the first instance of life  
experience is concluded that the first instance  
of life is the first instance of life  
the first instance of life is the first instance of life  
a part of the whole  
that nothing is better it was a part of the  
whole that was not a part of the whole  
the first instance of life is the first instance of life  
the first instance of life is the first instance of life

again and again, and the result being always the same, I must conclude that they are correct altho in opposition to Mr Hunters.

Into two ounces of blood as soon as <sup>it</sup> flowed from the vein of a healthy person, I introduced a Thermometer which rose to  $92^{\circ}$ . And in another vessel I had the <sup>same</sup> portion of coagulated blood heated to the same degree.

The Thermometer in recent blood stood at.....	The Thermometer in the coagulated blood heated to $92^{\circ}$
In 2 minutes it fell to 90	In 2 minutes it fell to 90
In 4 D°..... D°..... 88	In 4 D°..... D°..... 88
6 1/2 D°..... D°..... 86	6 1/2 D°..... D°..... 86
8 D°..... D°..... 85	8 D°..... D°..... 85
10 D°..... D°..... 84	10 D°..... D°..... 84
13 D°..... D°..... 82	13 D°..... D°..... 82
16 D°..... D°..... 80	16 D°..... D°..... 80
19 D°..... D°..... 79	19 D°..... D°..... 79

The temperature of the room was  $62^{\circ}$  when the experiment was made



I repeated this experiment, with a little variation only, in the manner of making it. The result was the same.

In a basin filled with ice, I placed a cup containing four ounces of blood, just drawn from the arm of a healthy person.

The Thermom. in fresh blood stood at.....	The Thermometer in coagulated blood heated stood at
84°	84°
In 3 minutes it fell to 78	In 3 minutes it fell to 78
In 6 D°... D°... 72	In 6 D°... D°... 71
9 1/2 D°... D°... 68	9 1/2 D°... D°... 66
12 D°... D°... 65	12 D°... D°... 63
14 1/2 D°... D°... 60	14 1/2 D°... D°... 60
18 D°... D°... 58	18 D°... D°... 57
22 D°... D°... 53	22 D°... D°... 54
25 D°... D°... 51	25 D°... D°... 52

These experiments, I trust, were made with accuracy, and from their result, we must conclude, that this "heat retaining" power is not possessed by the blood, when taken out of the body, but

I repeat the experiment with a little variation only  
in the manner of making it. The result was the same  
in a few days with me, I found a cup of  
tea for some of these just now from the  
room of a healthy person.

The following is from the same person, the treatment is repeated

24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100														
10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100

These experiments, I think, now made with  
accuracy, give from their result, we must conclude  
that the best thing, for us, is not to be  
of the order taken out of the body.

that it loses its heat in the same proportion as the coagulated blood: But even in the body, it does not possess this power, for we find that in the short time it takes to circulate, it loses several degrees of its heat. In the lungs, where it receives its heat it is about  $96^{\circ}$  or  $98^{\circ}$ : but in the superficial veins it is not more than  $92^{\circ}$ ; hence in the course of 4 or 5 minutes the time it takes to perform its circulation its parts with 4 or 5 degrees of heat.

Mr Hunter himself acknowledges that his experiment, on this subject, was not accurately made, for, says he, "the two bloods should have been at the same temperature." Whereas he had the coagulated blood heated to  $98^{\circ}$  while the recent blood was only  $96^{\circ}$ . The coagulated blood being the hottest would of course part with its heat faster to any "neighbouring colder body," for we know the warmer



that of time the heat in the same proportion  
as the temperature rises; that now in the day  
it does not possess the power for us here that  
in the short time it takes to conduct it from  
around surface of the heat of the lamp when  
it occurs to heat it is about 90° or 92°;  
but in the superficial point it is not more  
than 90°; heat in the course of 2 or 3 minutes  
the time it takes to perform its revolution  
the point with the 2 degrees of heat.  
The shorter the revolution that is  
required, on the subject, not not necessarily  
more, for say in the case where it is  
one of the same substance, there is  
that the temperature does not rise to 92°  
while the heat there was 90°; the con-  
duction being the least cause of error  
just with the heat factor is multiplied  
during the day, for we know the reason



any body is, the faster it will part with its heat  
to any colder body.

We shall now proceed to consider Mr. Hunter's  
~~next~~ argument, which is founded upon a supposed  
similarity, in the coagulation of blood and ~~and~~  
the contraction of muscle. But for my part  
I conceive the two contractions are widely dissi-  
-milar. When a muscle is stimulated to con-  
-tract, it again returns to its state of relax-  
-ation, if the stimulus be removed; But it is  
not so with the blood; for when once contrac-  
-ted, like other elastic, inanimate bodies, it  
remains so. With equal propriety we might  
say there is a similarity between the coagu-  
-lation of Milk and the contraction of  
muscles, for milk will coagulate and con-  
-tract so much as to leave the sides of the  
vessel and form a cup like appearance and  
squeeze out the serum just in the same man-  
-ner

any thing in the world. It will part with its heat  
it may exist long.  
It shall now proceed to consider the manner  
in which the heat is furnished upon a surface  
similarity in the regulation of heat and cold  
the contraction of matter. But for my part  
I consider the heat contraction as nearly dis-  
tinct. It has a source in stimulation to con-  
tract. It again returns to the state of expan-  
sion if the stimulus is removed; but it is  
not so with the blood. For when once ex-  
posed to the action of the stimulus, it  
remains so. With regard to the heat  
any there is a similarity between the con-  
traction of matter and the contraction of  
matter for matter will contract and the  
heat is much as to draw the heat of the  
body and from a cup left open and  
empty and the steam just in the open air.

that blood does and the coagulation is also hastened by many stimulants, as electricity &c as is that of the blood, yet nobody would argue from hence that milk is alive. "And as the contraction in coagulation is the only particular effect instanced as produced by the stimulating influence on the blood, and as this effect would not be admitted as proof of vitality in any other fluid whatever, it can not as far as I am able to discover be made use of in illustration of the point in question."

We come now to consider the argument in which Mr Hunter seems to place most confidence for the support of his doctrine, that is, that extravasated blood is the bond of union between divided parts, and that it has the power within itself of forming vessels, *namely*

The only proof which Mr Hunter  
had:

that blood does not circulate in a  
 constant by many thousands as it is  
 as is that of the blood. yet no body would  
 suppose from hence that such is the case  
 as the circulation in capillaries is the only  
 particular effect intended as part of the  
 stimulating influence on the skin, and as the  
 effect would not be admitted as part of it  
 to help in any other fluid whatever, it is  
 not as far as I am able to discover  
 made use of in other parts of the body  
 in question.

It seems now to coincide the arguments  
 in which the Hunter seems to place most on  
 distance for the support of his doctrine that  
 that excretion of blood is the term of time  
 before which blood and that it has the  
 power within itself of forming vessels  
 the very first which the Hunter

had, that the coagulum forms vessels, was  
an experiment made by himself. He says "By  
injecting the crural artery of a stump, above  
the knee, where there was a small pyramidal  
coagulum, I have filled this coagulum with  
my injection, as if it had been cellular; But  
there was no regular structure of vessels." But  
Mr Hunter himself does not seem to place much  
confidence in this experiment, and we don't  
receive if it proves any thing, it proves ~~that~~  
that in this instance, at least, the coagulum,  
did not form vessels; as Mr H says, he could  
not discover any regular structure of vessels.

Then as there is no experimental proof that the  
coagulum forms vessels; nerves &c; this opinion  
must be founded on mere hypothesis.

Although Mr Hunter in his work on  
the blood, gun shot wounds &c seems generally  
to think that coagulated blood, has the  
power

and that the conclusion from which  
an argument may be drawn, is not  
regarding the future state of a thing, but  
the fact, that there is a small quantity  
of gold, I have felt the conclusion with  
my eyes, and it has been evident, that  
there was no regular structure of objects, but  
it has been necessary for me to follow such  
conclusion in the argument, and to do so  
with a view of the future and thing, of which  
that in the instance of the conclusion  
it is not from which it is not, but it is  
not, however, and regular structure of objects  
that as there is an experimental proof that the  
conclusion from which it is not, but it is  
must be founded in more particular  
although, it has been in the case of  
the first part of the argument of the first  
to think that conclusion does, but the

power of forming vessels, and uniting divided parts, yet in one place he says, that this may be brought about by the inoculation of the divided vessels. In a note to page 113. of his work on the blood &c. he says, "In many inflammations of the eye we find an artery, or arteries passing from the tunica conjunctiva to the cornea, and ramifying on that part. These have been cut across to prevent the influx of the blood; the two ends are seen to shrink, but in a little time they are again perceived to unite, and the circulation to be carried on as before." Now if we see this the case in one instance, why not suppose it is the case in every instance, that is not visible to the eye, or why search <sup>out</sup> a new method which is entirely hypothetical.

Coagulated blood, it is probable, by its glutinous texture, may be calculated



power of forming objects and thinking  
parts yet in our power to say that the  
may be brought about by the introduction  
of the objective objects in a way to be  
of the work on the first in say "in many  
institutions of the eye we find an order  
or action passing from the inner organism  
to the outer, and assuming to that part  
the same does not work to prevent the  
influence of the object, the first in  
which, but in a little time they are again  
prevented to work and the conclusion is to  
consider as an object. Now if we do this  
case in the instance, why not suppose it is  
the case in every instance, that is not what  
is the eye, it may be said, a new method  
which is entirely hypothetical.  
Consequently, that it is possible by  
the statement before, may be considered



to favor and promote <sup>the</sup> reunion of divided parts  
but that it has the power within itself of  
forming vessels, nerves &c, is, we think, very im-  
probable. In the healing of wounds in which  
we can see the process go on, the vessels throw  
out granulations, and these unite to the sur-  
rounding parts, and the coagulated blood, if  
there be any, is reabsorbed; and why not sup-  
pose the same process to go on in the restoration  
of parts which are not visible to the eye;  
why invent a new mode of bringing about  
reunion, and this founded on mere hypothe-  
sis, when we see that parts can be readily  
reunited in another way.

We have thus briefly considered the  
arguments in favor of the vitality of the  
blood, and in as concise a manner as possible  
have endeavoured to shew that none of  
them are sufficient to support such an

*opinion*



opinion; How far we have succeeded we must  
leave to the candid and unprejudiced reader  
to decide. We do not deem <sup>it</sup> necessary to offer  
any apology, for opposing an opinion, which  
is taught us by some of the professors, The  
liberal indulgence of <sup>the</sup> investigation, in this  
university, is so remarkable as to render this  
unnecessary. Thus we shall take leave of this  
subject, but before I finish this essay, my  
duty impels me, to return my thanks,  
to each of the professors, for their zeal in  
giving instruction and in promoting the  
science of medicine. I have only to regret  
that it is not, more publicly, in my pow-  
-er, to acknowledge, the inestimable advantage  
of attending the lectures of the "illustrious  
professors," of this University.

Finis

J. Kello, born in Southampton County, Virginia, in the year 1785.

Professor of the University  
 of Cambridge the Secretary of the  
 in a acknowledgment the  
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 and especially for opposing an opinion which  
 is the case. It is not always necessary to offer  
 leave to the student and independent reader  
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FINIS